GAMOW-TELLER STRENGTH OBTAINED IN THE $^{52,54}Cr(p,n)^{52,54}Mn$ REACTIONS

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The $^{52,54}Cr(p,n)^{52,54}Mn$ reactions have been studied at 120 MeV using the IUCF beam swinger facility. Measurements were made over an angular range from zero to eleven degrees, using large volume neutron detectors with sub-nanosecond time resolution, located at a flight path of 130 meters. An overall energy resolution of less than 300 keV was obtained. Targets of ^{7}Li and ^{12}C were used to obtain an energy and efficiency calibration of the neutron detectors.

Angular distributions for discrete states below 5.0 MeV excitation energy and characterized by an L=0 angular momentum transfer are fitted with DWIA calculations involving $1f_{7/2}$ particle-hole transitions, but not with $1f_{7/2} \rightarrow 1f_{5/2}$ particle-hole transitions.

Several two-particle stripping and pick-up reactions are reported[1] to excited states in ^{52}Mn. In particular the $^{54}Fe(d,\alpha)^{52}Mn$ reaction is interesting. The nucleus ^{54}Fe has isospin equal to one and the (d,α) reaction does not transfer isospin. Thus only T=1 states in ^{52}Mn are excited in this reaction. The reported[1] 1^+ states below 4.8 MeV excitation energy in ^{52}Mn are at 0.55, 2.63, 3.57 and 4.38 MeV. All these states are excited in the (p,n) reaction with similar relative strengths. The strongest 1^+ strength corresponds to the 2.67 MeV transition.

A preliminary value for the total GT strength observed up to 15 MeV excitation energy is 5.5 ± 1.5. Assuming a value $S(\beta^+) = 6$ (obtained from systematics in the N=28 isotones), the observed strength is only about 30% of the estimated value $S(\beta^-) = 18$. A similar quenching has been estimated in the M1 strength reported in (e,e') and (p,p') measurements.[2]

Analysis of the ^{54}Cr data is in progress.

1) Data Sheets for A=52, J.R. Beene, Nucl. Data Sheets 22 (1978) 235.

2) J. Rapaport et al., Nucl. Phys. A427 (1984) 332.